CLAIMS

1. Equipment for exchanging power, in shunt connection, with an electric power network (N), the power network having a nominal voltage (Un) of a fundamental frequency (*f*) and a given phase position, the equipment comprising a reactive impedance element (C, LC) and a voltage source converter (VSC) for mutual connection in series, the converter being intended for generation of a fundamental voltage (US) within a control range (A) that limits the amplitude of the generated fundamental voltage, **characterized** in that the control range of the converter limits the amplitude of the fundamental voltage to a value that is lower than the nominal voltage of the power network and comprises generation of a reactive component (USr) of the fundamental voltage with a phase position (ϕ) that either coincides with the phase position for the voltage of the power network or that deviates by 180° electrically from the phase position for the voltage of the power network.

2. Equipment according to claim 1, **characterized** in that the reactive impedance element consists of a capacitor (C).

3. Equipment according to claim 1, **characterized** in that the reactive impedance element consists of an inductor (LC).

4. Equipment according to claim 3, **characterized** in that it comprises a transformer (T) connected between the inductor and the converter.

5. Equipment according to any of the preceding claims, **characterized** in that the control range of the converter comprises, in addition thereto, generation of an active component (USa) of the fundamental voltage with a phase position that deviates from the phase position for the voltage of the power network by +90° electrically or by -90° electrically and with an amplitude that brings about an exchange of active power with the power network.

6. Equipment according to any of the preceding claims, **characterized** in that the converter comprises a control system (71-74) for controlling the fundamental voltage generated by the converter with respect to amplitude and phase position within the control range, in dependence on electric variables (U, I) sensed in the power network.

7. Equipment according to claim 6, **characterized** in that the control system comprises means (71, 75-76) for forming a reference value (ILR) for the current (IL) of the converter, in dependence on a voltage variation sensed in the power network, said reference value resulting in both an active and a reactive component of the fundamental voltage.

8. Equipment according to claim 7, **characterized** in that said means in the control system comprises means (75) for forming, in dependence on a sensed current (I) and a sensed voltage (U) in the power network, a value (p(t)) of active power flow in the power network, a signal-processing member (76) with a phase-advancing characteristic in a frequency interval surrounding the frequency 8.8 Hz which is supplied with said value of active power flow in the power network, and means (7) for forming the reference value for the current of the converter in dependence on an output signal from said signal-processing member.

9. A method for exchanging power, in shunt connection, with an electric power network (N) with a nominal voltage (Un) of a fundamental frequency (f) and a given phase position, wherein

a reactive impedance element (C, LC) and a voltage source converter (VSC) are connected to each other in series connection and in shunt connection to the power network, and wherein the converter generates a fundamental voltage (US) within a control range (A) that limits the amplitude of the generated fundamental voltage, **characterized** in that

the control range of the converter is chosen such that the generated fundamental voltage is lower in amplitude than the nominal voltage of the power network, and comprises ge-

neration of a reactive component (USr) of the fundamental voltage with a phase position (ϕ) that either coincides with the phase position for the voltage of the power network or that deviates by 180° electrically from the phase position for the voltage of the power network,

whereby a reactive power exchange with the power network is achieved by controlling the fundamental voltage generated by the converter within the control range.

10. A method according to claim 9, **characterized** in that

the control range of the converter is chosen such that, in addition thereto, it comprises generation of an active component (USa) of the fundamental voltage with a phase position that deviates from the phase position for the voltage of the power network by +90° electrically or by -90° electrically,

whereby an active power exchange with the power network is achieved by controlling the voltage generated by the converter, with respect to its amplitude, within the control range and to a phase position that deviates from the phase position for the voltage of the power network by +90° electrically or by -90° electrically.

11. A method according to claim 9, wherein the converter comprises a control system (71-74) for controlling, in dependence on electric variables (U, I) sensed in the power network, the fundamental voltage generated by the converter, with respect to amplitude and phase position, within the control range, **characterized** in that

a value (p(t)) of active power flow is formed in the power network,

said value of active power flow in the power network is supplied to a signal-processing member (76) with a phase-advancing characteristic in a frequency interval surrounding the frequency 8.8 Hz, and that

a reference value (ILR) for the current (IL) of the converter is formed in dependence on an output signal from said signal-processing member, which reference value results in

an active component of the fundamental voltage generated by the converter.

12. Use of equipment according to claim 1 for exchange of reactive power with an electric power network.

13. Use of equipment according to any of claims 3 and 4 in transmission lines for reducing overvoltages, for damping power oscillations, and for voltage control at varying transmission of power in the transmission line.

14. Use of equipment according to claim 8 for exchange of active power with a power network for reducing flicker.